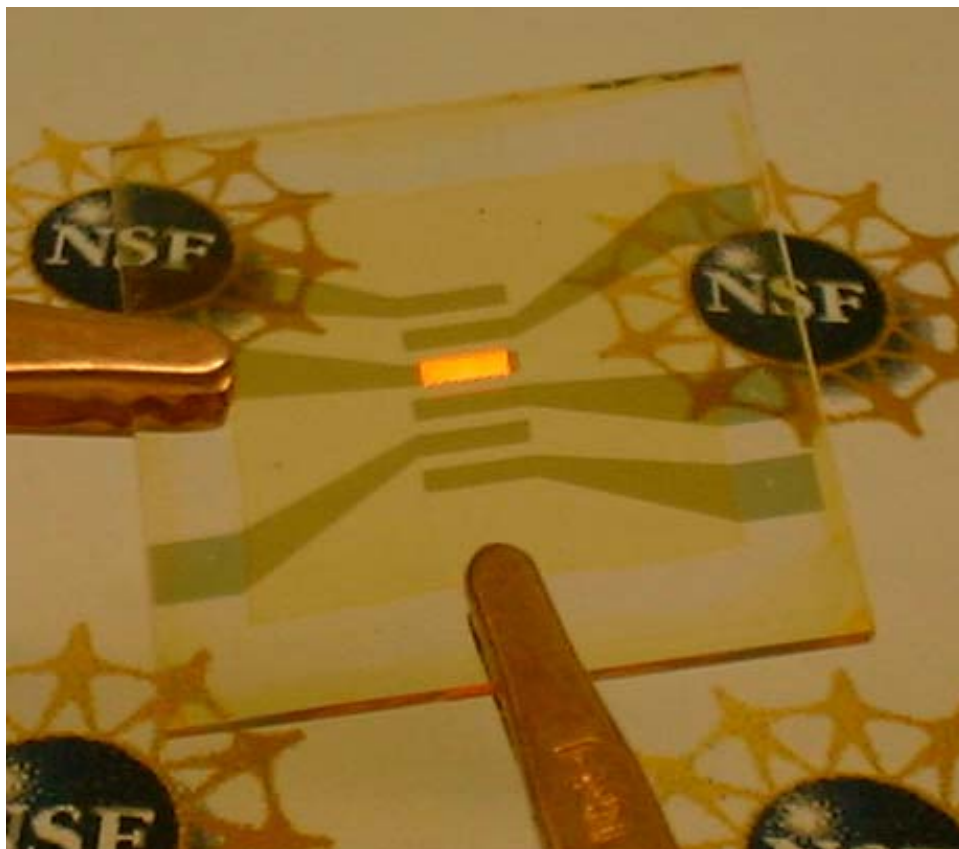


Light-emitting devices made from organic complexes of Osmium



George Malliaras, Career Award DMR-0094047

Osmium-based devices light the way

Imagine replacing all light bulbs in your house with thin sheets of plastic that emit bright light of adjustable color! This is the idea behind the development of new organic materials for solid-state lighting. Researchers at Cornell University recently developed light-emitting devices that are based on organic complexes of Osmium. These complexes carry a net 2+ charge and are compensated by two small negative counter ions. Upon application of a bias these counter ions accumulate near the anode electrode and enhance hole injection. At the same time, the depletion of counter ions near the cathode enhances electron injection. As a result, devices that operate at the theoretical limit of efficiency can be made with air stable electrodes such as Au. This is a big improvement compared to conventional organic light-emitting devices that require the use of electrodes from metals such as calcium or magnesium, which deteriorate rapidly under ambient conditions. The brightness of the Osmium-based devices exceeds 300 cd/m² at just 3V of applied bias, which rivals the state-of-the-art for organic light-emitting devices and brings solid-state lighting closer to reality.

Reference:

S. Bernhard, X. Gao, G.G. Malliaras and H.D. Abruña, *Adv. Mater.* **14**, 433 (2002).